1. WHAT ISSUE DOES THE PROPOSED RESEARCH ADDRESS WITHIN THE ELIGIBLE RESEARCH THEME AREA?

This proposal focuses on thematic area 4: "managing for quality and safety (including issues related to infections acquired in hospitals)".

Hospital-acquired infections are the most common serious complication of hospitalization, and the fourth leading cause of death among Canadians (1). Hand hygiene, defined as the act of washing one's hands with soap and water, or disinfecting them with an antiseptic agent, has been recognized for more than 150 years as the single most effective and cost-effective means of preventing hospital acquired infection, as well as an effective means of preventing illness in the community that may lead to hospitalization (2-5). Despite this, many studies have documented that compliance with hand hygiene recommendations in healthcare settings is consistently less than 50% (2,6-10). Intensive education programs have been associated with modest improvements in hand hygiene and dramatic reductions in rates of hospital-acquired infections (11-18). However, few programs have documented continuing success. The aim of this proposal is to provide guidance to decision makers throughout the health care system in facilitating the development of successful hand hygiene programs, and thus in reducing morbidity and mortality from hospital-acquired infection.

2. WHAT ARE THE RESEARCH QUESTIONS AND OBJECTIVES?

Overall objective

To provide decision-makers in health care with the understanding and tools necessary for the development and successful implementation of hand hygiene improvement programs in health care.

Specific objectives

1. To understand the barriers (structural, organizational, cognitive and social) to hand hygiene adherence, particularly in healthcare settings.
2. To develop toolkits to assist healthcare agencies and institutions in developing effective and efficient hand hygiene programs.
3. To assist professional organizations and policy makers in understanding what strategies are most effective in facilitating the development of hand hygiene programs.
4. To evaluate whether well-designed hand hygiene programs implemented in Canadian healthcare facilities can be associated with a substantial reduction in hospital-acquired infections, particularly those due to antimicrobial resistant organisms.

Hypothesis

A better understanding of knowledge and attitudes towards hand hygiene and of barriers and incentives to adherence to practice recommendations will assist in the development of effective and efficient hand hygiene programs for healthcare, and can be used to begin a process of changing social attitudes towards hand hygiene and the prevention of infection.

3. WHAT EVIDENCE IS THERE THAT THIS ISSUE IS IMPORTANT FROM A MANAGER OR POLICY MAKER PERSPECTIVE?

Hospital-acquired infections are the most common serious complication of hospitalization (1). Eight to 15% of hospitalized patients develop infections as a result of their care. Hospital-acquired infections were estimated to be the 11th leading cause of death two decades ago (19); recent Canadian data suggests that thay are now the 4th leading cause of death for Canadians.

Initial evidence for the risk of health care infection associated with transient carriage of bacteria on the hands of health care workers, and the effectiveness of the removal of such bacteria in protecting patients, dates to the mid 1800s. In 1843, Oliver Wendell Holmes concluded that puerperal fever was spread by then hands of health personnel (20). Independently, in 1847, Ignaz Semmelweis

demonstrated that the dramatically higher maternal mortality rate associated with physician delivery of babies (as compared to midwives) at the Vienna General Hospital could be reduced by having physicians clean their hands between the autopsy room and visits to clinic patients (21). Many studies have documented that health care workers hands become contaminated with hospital pathogens in the course of providing care, and *in vitro* studies of hand hygiene demonstrate that handwashing or hand disinfection with alcohol effectively removes these pathogens (2,4,5).

Within healthcare, the recent literature with respect to the efficacy of hand hygiene consists largely of before and after studies, most likely as a result of two issues: first, an ethical concern about the use of control groups in the face of existing evidence and recommendations from expert groups, and second, the expense of conducting randomized controlled trials when the unit of analysis must be at a minimum a hospital ward (and, because of communication between hospital wards, more reasonably a hospital) and where the outcome is hospital acquired infections. However, controlled trials do exist, as do a substantial number of well controlled before/after studies (Table 1) demonstrating that improving adherence to hand hygiene is associated with dramatic reductions in hospital-acquired infection, and the transmission of hospital pathogens. More recently, numerous studies have focused on the potential for improved hand hygiene to reduce infections in the community (Table 2). Both randomized controlled trials and observational studies now document that improved hand hygiene in the community is associated with equally dramatic reductions in infection rates.

Table 1: Recent studies of the impact of programs to improve adherence to hand hygiene on nosocomial infections

Author/year/ref	Design	Intervention	Outcome
Larson/2000/11	Quasi-experimental (before/after in case and control institution)	Organizational change	33% decrease in MRSA case hospital vs. 31% increase in control
Pittet/2000/12	Before after	Multimodal	41% decrease NI* (P=.04) 57% decrease MRSA (P<.001)
Marena/2002/13	Prospective, non-randomized crossover	Posters, training course, new product	14.5% decrease in NI (NI) (P=NS)
Brown/2003/14	Before-after	Multimodal	33% decrease in antibiotic use
Swoboda/2004/15	Quasi-experimental	Electronic monitoring	22% decrease in NI 11% decrease in ARO** colonization (P=.01)
Lam/2004/16	Before-after	Multimodal	47% decrease total NI (P=.09)
Won/2004/17	Before-after	Multimodal	Sig decreas total NI (P=.003) 69% decrease resp NI (P=.01)
Mayer/2005/18	Before-after	Multimodal	62% decrease in VRE infection

Table 2: Recent studies of the impact of hand hygiene improvement in community settings

Setting/design	Author (ref)	Outcome
School based RCTs		Absenteeism due to upper respiratory and gastrointestinal illness
	White (22)	33% reduction
	Dyer (23)	34% reduction
	Hammond (24)	20% reduction
	Guinan (25)	49% reduction
	Morton (26)	significant reduction
	Thompson (27)	28% reduction
Community (Meta-analysis of studies to reduce diarrhea)	Curtis (28)	42% reduction in diarrhea risk
Military recruits	Ryan (29)	45% reduction in out-patient visits for resp illness
University residence	White (30)	43% fewer sick days

For these reasons, hand hygiene, defined as the act of washing one's hands with soap and water, or disinfecting them with an antiseptic agent, before and after all patient contacts is recommended in all published infection control and public health guidelines and is considered the standard of care for all healthcare workers (2-5).

Nonetheless, many observational studies have demonstrated that healthcare workers do not adhere to these guidelines: reported adherence has ranged from 13%-70%, with a median of about 30%; over 20 years of study, there is no evidence that compliance has increased (see Table 8 of ref 2, refs 6,10, Appendix 3). This lack of adherence to guidelines has been a concern for infection control programs for as long as they have existed. Over the last 150 years, many programs to improve hand hygiene have been implemented in hospitals. Such programs are frequently, although not universally, associated with improvements in hand hygiene practice and decreases in nosocomial infection. (2, Table 1, Appendix 3) It is likely that a publication bias exists, such that unsuccessful programs are less likely to be submitted for publication or published, although there is no documentation of this effect. In addition, it is clear that the improvements in practice achieved by these programs have been modest at best, and are very difficult to maintain. Recently, several different approaches have been associated with more sustained increases in adherence to hand hygiene (Table 1). However, only two have been progressed beyond the pilot stage, and in a limited number of settings. Despite relatively modest improvements in hand hygiene, these programs were associated with dramatic and sustained reductions in hospital-acquired infection rates (11,12).

Concern regarding workload, understaffing, insufficient time to follow proper procedures and a generally low safety climate in healthcare have been cited as important issues to explain lack of compliance with infection control procedures (31). Such factors have not received enough attention in handwashing programs. Moreover, there is increasing concern among healthcare workers, and the unions that represent them, that they are putting themselves and their families at risk if they do not follow proper procedures. Attention to protecting the healthcare workforce from infectious disease is only now receiving adequate attention.

Over the last decade, the role of complications of medical care in increasing patient morbidity and mortality, and on healthcare system costs, has been increasingly recognized. Patient safety, the protection of patients from all types of these complications, is rapidly emerging as an important systems issue within healthcare, and one which has the potential to substantially reduce patient morbidity and increase the efficiency of care delivery. Hospital-acquired infections are a major contributor to preventable patient risk in hospitals: they affect at least 10% of hospitalized patients,

and at least 1/3 of these infections are preventable. Thus, a number of decision-maker bodies in healthcare have recently recognized the need for improved hand hygiene.

Health Canada and the US Healthcare Infection Control Practices Advisory Committee have both recently published guidelines regarding hand hygiene in healthcare; the US document contains more specific recommendations regarding the development and monitoring of hand hygiene adherence. Both US and Canadian healthcare accreditation bodies have revised their standards to reflect a need for healthcare organizations to develop and prioritize patient safety programs. Currently, the Canadian standards do not specifically mention hand hygiene programs. However, the standards of the United States Joint Commission on Accreditation of Healthcare Organizations (JCAHO) requires that organizations demonstrate compliance with the US consensus guideline for hand hygiene in health care settings. Other patient safety initiatives in North America also recognize the impact of hospital-acquired infections and the importance of hand hygiene: for instance, the Ontario Hospital Association's Patient Safety Tips campaign has considered tips related to hand hygiene compliance (unpublished information, the Ontario Hospital Association). The US National Patient Safety Foundation and the Veteran's Administration National Center for Patient Safety programs also contain recommendations for hand hygiene programs.

Concurrently, the United Kingdom National Patient Safety Agency has developed the "clean**your**hands" campaign, a project based on "the unacceptably low levels of hand hygiene compliance amongst NHS staff and the effect this has on the spread of microbes capable of causing avoidable healthcare associated infections". The objective of this campaign is to "develop solutions that improve hand hygiene compliance and reduce health care associated infections".

In October, 2004 the World Health Organization launched the World Alliance for Patient Safety. The purpose of the Alliance is to "raise awareness and political commitment to improve the safety of care and to facilitate the development of patient safety policy and practice in all WHO Member States". Each year the Alliance will deliver a number of work programmes covering advocacy, systemic and technical aspects of patient safety. A key programme of the Alliance is the "Global Patient Safety Challenge". The topic chosen for the first challenge for 2005 -2006, is the prevention of health care-associated infections – key objectives are in the box below (the WHO guidelines on Hand Hygiene are expected to be published in late 2005.

World Health Organization Global Patient Safety Challenge objectives for 2005/2006

- Designate hand hygiene as a patient safety priority worldwide
- Promote hand hygiene globally and at country level, across all levels of health care settings
- Develop evidence based WHO Guidelines on Hand Hygiene in Health Care
- Develop comprehensive and integrated infection control implementation strategies that facilitate system changes including staff education and motivation to promote behavioural modification, the use of performance indicators, and stimulate stakeholder support
- Provide issue recommendations and develop instruments for continuous, long-term
- Monitoring and feedback mechanisms, as well as outcome measures to monitor progress.

4. HOW DO YOU SEE THE RESULTS OF THIS PROJECT AFFECTING THE FINANCING, ORGANIZATION, MANAGEMENT, REGULATION, OR DELIVERY OF SERVICES FOR CANADIANS?

Although there has been a great deal of recent interest in improving hand hygiene in healthcare, most of it has been outside of Canada, and few healthcare organizations in Canada have hand hygiene improvement programs. Improving hand hygiene remains a relatively resource

intensive process, which has required continuing investment to maintain: few organizations have been willing to either initiate or continue the investment.

The current focus on patient safety, accumulating data on the impact of hand hygiene in healthcare and community settings, and the availability of alcohol-based hand hygiene products provide an opportunity to initiate a process which will in the short term increase hand hygiene adherence in acute healthcare settings (and thus reduce patient morbidity and mortality from hospital-acquired infections), and which will ultimately result in a change in social norms related to hand hygiene that will reduce both hospital and community-acquired infection rates and the health care costs associated with their treatment. We anticipate that this project may result in changes to accreditation standards, and to provincial standards for infection control and occupational health.

5. WHAT ARE THE METHODS AND APPROACH TO ANALYSIS?

Phase 1: Information retrieval

The information retrieval phase will provide necessary background information that will inform all other phases of the research. It will also provide necessary technical data to support later development of information for tool-kits.

(i) Literature review

Systematic reviews of the literature will be conducted to assess: (i) burden of illness due to hospital and nursing home-acquired infections; (ii) impact of compliance with hand hygiene on rates of hospital and nursing home-acquired infections; (iii) effectiveness of hand hygiene in reducing nosocomial infections; (iv) effectiveness of strategies designed to improve hand hygiene behaviour among healthcare workers; (v) barriers to hand hygiene compliance among health care professionals; (vi) strategies associated with success in behaviour change for health professionals.

Studies will be identified by searching Medline, EMBASE, Cinahl, PsycLIT, SIGLE, the UK National Research Register and the Cochrane and Campbell Collaborations, and augmented by reviewing the references of the selected articles and reviews on the topics, and contacting expert bodies, and study authors to identify unpublished data (see Appendix 2 for details of the search strategy). Observational studies of interventions will be assessed using Cochrane group and NICE guidelines. We will triangulate data on consistency of barriers across categories of study (eg. is a particular barrier identified in both focus group studies and surveys).

From the literature review, a theoretical framework specific to hand hygiene, and to the development of hand hygiene programs in hospitals will be developed. This framework is expected to be derived from a combination of: theoretical models of behaviour change at the individual (health belief model, theory of reasoned actions, theory of planned behaviour, social cognitive model, transtheoretical model of behaviour change) (32-34), inter-personal level (Kanter's structural theory of power in organization) (35), community and social levels (theory of ecologic perspective) (36), and more practical frameworks for knowledge translation in healthcare (the Ottawa model of healthcare research use (37), the Grol's and Grimshaw & Smith's classifications of approaches to changing practice (38-40).

(ii) Surveys

Two surveys will be conducted:

1. A survey of infection control practitioners and hospital epidemiologists in Canada (N=1000), the United States (N~11,000) and the United Kingdom (N~4000) will be performed to identify unpublished information on hand hygiene adherence, to identify programs (successful and not), and to obtain opinions about barriers and proposed strategies to overcome them. Surveys will be mailed to members of CHICA-Canada, and to acute care hospitals and licensed long term care facilities across

Canada, using the Tailored Design Method (41). Members of the Society of Healthcare Epidemiology of America (SHEA), the Association of Practitioners in Infection Control (APIC), and the Hospital Infection Society (HIS) will be surveyed using email that provides a link to a web-based survey. Permission will be sought to use the web-sites of these organizations to post the survey. Practitioners will be asked to describe the state of hand hygiene and programs for its improvement in their facility, to identify and prioritize barriers to and incentives for hand hygiene identified in the literature reviews, to report on their experience with hand hygiene programs and audits, and to provide any additional advice they feel is of importance.

2. A survey of authors who have published literature, or recently presented abstracts in the field of hand hygiene. This survey will be sent my email if possible, or by mail if not, again using the Tailored Design Method. As noted above, these authors will be asked to confirm conclusions and identify unpublished data. They will also be asked to comment on and to prioritize barriers and incentives (eg. under what circumstances do you think this will or will not work), and for any additional advice they have regarding the development and implementation of programs. Subsequently, a sample of these authors will be selected for semi-structured interviews similar to those of experts below, to explore the successes and obstacles to the successes of the programs described.

Phase II: Qualitative Interviews and Focus Groups:

This phase will have three components: i) focus groups with health care workers; ii) interviews with experts and iii) interviews with decision makers.

(i) Focus groups

The focus groups will be conducted prior to the interviews. This phase will build on the information provided in Phase I and specifically focus on perceptions of guidelines, perceptions of barriers related to hand hygiene, and the potential for the different strategies identified for improving practice. The objectives of the focus groups will be to explore barriers to hand hygiene, the value of different sources of information in changing behaviour, other factors likely to influence decisions about hand hygiene, and strategies to overcome the identified barriers. Separate focus groups will be conducted with: registered nurses, practical nurses/nurses aides, nursing managers/educators/clinical nurse specialists, housestaff and medical staff, housestaff alone, medical students and nursing students, infection control practitioners, other health care professionals (eg. RT, social work, radiology technologists, physiotherapists, pharmacists, OTs), other staff (pastoral care service assistants, housekeeping, porters, ward clerks). We will initially conduct two focus groups (10 participants each) for each health care worker type, then continue until saturation of themes is reached. Subsequent to the acute care focus groups, three focus groups of nurses and health care aides from long term care will be conducted (to be extended as necessary for saturation). Initial discussion will be open, but facilitators will use a guide to ensure that all relevant areas are explored (42,43).

(ii) Interviews with experts

In the ensuing interviews with experts, we will explore the themes that have emerged from information retrieval and focus groups. Three types of experts will be included:

(i) those with experience with implementing hand hygiene programs (eg. Drs. Pittet, Larsen, and McGuckin, staff of the UK National Patient Safety campaign, staff of the US Veteran's Administration hand hygiene pilot projects), and others identified by the information retrieval and the snowball technique.

(ii) those with expertise in knowledge translation/guideline adoption in clinical practice (eg. Dr. J. Scrimshaw, Dr. D. Davis),

(iii) those with expertise in introducing effective preventive practice changes (eg. seat belt use, smoking, influenza vaccination).

Interviews will be semi-structured and guided by codes and categories identified by focus groups, and by the framework developed in the systematic review of the literature, and modified as necessary as new themes emerge. We estimate that about 10 interviews will be required in each of these groups. In addition, experts in specific areas identified by the information retrieval or focus groups (eg. skin care, academic detailing) as important to particular interventions will be interviewed about issues specific to their expertise.

(iii) Interviews with decision makers

Finally, we will interview policy makers at Canadian and international patient safety organizations (see Appendix 2), health care professional organizations, and government decision-makers about the themes that have arisen regarding structural and policy changes that may impact on hand hygiene programs. These semi-structured interviews will explore the options available for policy regarding hand hygiene at various levels of government, obtain the views of decision makers regarding the relative priority of hand hygiene and other patient safety interventions, and identify potential areas for integrating hand hygiene recommendations into government/agency programs.

All interviews/focus groups will be transcribed verbatim with transcriptions assessed for accuracy (overall methods as per refs (42,43). To monitor progress and permit follow-up of emerging issues, interviewing, transcription and analysis will proceed concurrently. Initial focus groups will be coded openly by the study coordinator, a graduate student and an investigator (AM), who will then meet to identify common codes. Data will then be entered into QSR NUD*IST (NVivo) software, with accuracy of entry verified by a second individual. Periodic assessment of the coding process will be conducted by the investigators through debriefing committee meetings to evaluate adequacy of codes in representing the key issues. The debriefing committee will consist of the co-investigators not involved in interviewing the informants or conducting the focus groups.

A series of advisory board meetings and teleconferences will review the accumulating data in phases I and II (see section 8). The meetings will be to achieve consensus in two areas: recommendations regarding strategies to improve hand hygiene adherence in health care, the organization, content and structure of tool kits for hand hygiene programs in healthcare settings.
The advisory board will comprise, in addition to academic co-investigators:
(i) Ms. Julie Boudreault (decision-maker co-applicant, Ontario Ministry of Health)
(ii) Ms. Shirley Paton, (decision-maker co-applicant, Nosocomial and Occupational Infections, Public Health Agency of Canada),
(iii) Ms. Paula Greco (decision-maker co-applicant, Canadian Council on Health Services Accreditation)
(iv) Ms. Roz Smith and Ms. Sudha Kutty (decision-maker principal co-applicants, Ontario Hospital Association)
(v) Ms. Adrienne Brown (collaborator, Community and Hospital Infection Control Association of Canada)
(vi), Dr. Ted Boadway (decision-maker co-applicant, Ontario Medical Association),
(vii) Dr. Robert Wise (consultant, US Joint Commission on Healthcare Accreditation.
(viii) Mr. Gilad Shohan (co-applicant, decision-maker, Medonyx Inc), an award-winning industrial designer with an interest in hand hygiene
(ix) a representative from the behavioural science research group of GOJO industries (to be named)
(x) Mr. Daniel Carriere, CEO of Southlake Regional Healthcare
(xi) Ms. Christine Dalgliesh, RN, Administrator, the O'Neill Centre)
(xii) Dr. Didier Pittet (consultant, hospital epidemiologist, University of Geneva Hospitals, chair WHO Global Campaign for Hand Hygiene).
We have requested membership from the Ontario Nursing Association, and, should this project be funded, will also be approaching the Ontario Association of Respiratory Therapists, the UK National

Patient Safety "cleanyourhands" campaign, and the Association of Faculties of Medicine of Canada and identifying a patient/consumer representative.

Feedback on draft recommendations and tools will also be obtained via requests for comments on web-site postings, and email surveys of respondents to the phase I surveys. In addition, one-day workshop will be organized with Ontario stakeholders to review and revise draft recommendations and tool kits. Advisory board members representing organizations will also be asked to have their organization review and comment on the draft recommendations.

Phase III: Development and pilot testing of program/tool kit and components:

Auditing of rates of adherence to hand hygiene guidelines (with feedback) is regarded by many (see HICPAC guidelines, ref 2) as an important component of hand hygiene programs. Several different methodologies and tools are available (eg. www.handhygiene.org, www.patientsafety.gov). Observed adherence rates have been reported to vary depending on the observer (infection control practitioner vs. student), and may also vary depending on the tool and observation methods (eg. observation outside of rooms, vs. "shadowing" health care worker). Few data are available on these potential differences, or on the costs associated with performing audits. In the summer of 2006, two summer students will be hired to compare different methods of observation of hand hygiene adherence, to test different tools for the assessment of adherence, and to develop manuals and databases for auditing. For this project, "occult" auditing by infection control practitioners (observations made while on the unit for other reasons) will be compared to auditing by a resource on the unit, and to student audits (tentatively, comparison between least expensive method judged possibly effective by the advisory board vs. VA patient safety center methodology, but this may be modified). The observations will be carried out in July and August on four in-patient units at the Mount Sinai Hospital; each observer will record 300 observations (opportunities for hand hygiene) per unit (this will permit us to detect and label as significant a difference of 8-10% in estimates of hand hygiene adherence by different methodologies).

Pilots of tool kit components/strategies will be undertaken by infection control programs at two hospitals (Mount Sinai Hospital, and Southlake Regional Health Centre) and two nursing homes (Lincoln Place and Extendicare Guildwood) as part of this phase. This will permit modification of tools and strategies tested in practice. These pilot studies will also provide data on the resource and cost requirement for program implementation and maintenance, on the increases in hand hygiene adherence, use of hand hygiene products, and reductions in infections (at nursing homes, all infections; at hospitals, nosocomial bacteremia, MRSA, and *C. difficile* associated disease rates) that may be expected from the program in the short term.

The facilities will be provided with the tools as developed for the program, a part-time research assistant to facilitate/support the process (while simultaneously observing and evaluating), and supplies of hand hygiene products as needed. The research assistant will perform hand hygiene auditing before the start of the program, and will perform on-going audits as determined by the multidisciplinary team directing the program. S/he will also be responsible for ensuring that, whatever program choices are made, there is sufficient auditing of hand hygiene to assess the impact of the program on hand hygiene adherence (audits – minimum 300 observations to detect a minimum projected 20% increase - will be conducted prior to the introduction of the program, and 1-2 months, and 6-7 months after its introduction). Volume of hand hygiene product used at the facility will also be tracked.

The methodology used for surveillance for infections in nursing homes will be that used in a prior CIHR funded randomized controlled trial of multivitamin supplementation in long term care facility residents (facility surveillance plus periodic chart audits by trained surveyors, 43). In hospitals, existing laboratory based surveillance for nosocomial bacteremia (using NNIS methodology and definitions), colonization/infection with MRSA, and *C. difficile* associated disease

(using Canadian Nosocomial Infection Surveillance Program definitions and methodology,44) will be used to assess program impact. For nursing homes, the mean number of expected infections per resident per year is 1.1 (SD 0.3); with one year's surveillance before and after the program's initiation and with 400 residents, the study will be powered to detect a 5% decrease in the overall infection rate (one full year will be used, to permit accounting for seasonal variation in infection rates in long term care). Based on our current rates of 0.31 nosocomial MRSA acquisitions per unprotected exposure day (manuscript in preparation), a surveillance period of 98 days is sufficient to detect a 40% decrease in nosocomial acquisition after the intervention. Surveillance will continue for a one year period, to identify whether the intervention has this duration of effect.

We will also ask for permission to introduce and evaluate a teaching package about hand hygiene in at least three health professional faculties (by preference, a medical and nursing school). We expect that could be incorporated, for instance, into the year 2 microbiology teaching for nursing students at the University of Toronto (course currently coordinated by Dr. Donald Low), and into the hospital-based infection control teaching for medical students (taught in each academy, content coordinated by Dr. Mary Vearncombe). We will also approach the midwifery programs at Ryerson and McMaster Universities, and the Canadian Memorial Chiropractic College.

Ethics

All stages of the project will be submitted for approval to the institutional review boards of the Mount Sinai Hospital and the University of Toronto, as well as the ethics review boards of participating institutions. The intervention programs for improving adherence to hand hygiene are infection control priorities at the institutions in question. No healthcare workers will be identified in the auditing procedures for the study, and no students will be identified in any evaluations.

6. WHAT LINKAGES DOES THE PROJECT HAVE AND/OR WILL IT DEVELOP WITH SPECIFIC INDIVIDUALS AND/OR GROUPS OF MANAGERS AND/OR POLICY MAKERS?

The project is currently linked, via collaborators or co-investigators to: the Ontario Ministry of Health (nursing, strategic planning, an public health branches), the Ontario Hospital Association, the Ontario Medical Association, the Canadian Council on Health Services Accreditation, the Public Health Agency of Canada, the Community and Hospital Infection Control Association of Canada (CHICA-Canada), the US Joint Commission on Healthcare Accreditation, and to three Universities (Toronto, Ottawa, and the University of British Columbia).

As noted above, we will be seeking linkages with The Canadian Patient Safety Institute, the Quality Healthcare Network**,** and the Saskatchewan Healthcare Quality Council, for the purposes of discussing the role of hand hygiene in patient safety, identifying initiatives related to hand hygiene (eg. "Safer Healthcare Now", the Canadian response to the IHI's 100,000 lives campaign, currently being coordinated in Ontario by the Healthcare Quality Network, has hand hygiene as one component of the catheter-related bacteremia prevention bundle) within these organizations, and identifying opportunities for collaboration and knowledge translation via these agencies. We will be seeking the advice of PAACT (the Ontario Partnership for Antimicrobial Agents in Community Therapy), the Ontario Hospital Association, CHICA-Canada) and the Ontario Long Term Care Association to identify opportunities for developing workshops and "train the trainer" sessions. We will also ensure that the results of the project are promptly available to the infection control core competencies project, and the infection control subcommittee of the Ontario Provincial Infectious Diseases Advisory Committee. Over the course of the project, we will also be identifying potential partners for knowledge dissemination in other provinces through advisory board members.

7. WHAT STRATEGIES WILL BE USED TO ENCOURAGE KNOWLEDGE TRANSLATION INVOLVING INDIVIDUALS, MANAGERS AND/OR POLICY MAKERS IDENTIFIED ABOVE?

As noted, we will initially create a website based on the systematic review that will contain initial drafts of presentations that can be downloaded, audit tools, fact sheets, and links, etc. for use by agencies/infection control practitioners (for sample, see www.microbiology.mtsinai.on.ca, and follow links). A summary of the information available on the site, and an annotated list of resources will be included in the package mailed to infection control practitioners and patient safety managers for the survey. This website will be updated regularly during the project. Over the course of the project, we anticipate being able to create stories listing the website for the news sections of CMAJ, and for such publications as Hospital News (eg. during their special edition for infection control week).

We anticipate a number of products from the project:

(i) a final report, to be shared with decision-maker partners, and submitted for endorsement to their organizations, with specific recommendations for standards and policy at the national, provincial, and health care agency level;

(ii) peer-reviewed publications, targeted at Canadian Journals with wide readership (eg. CMAJ for physicians) – we anticipate that these publications will include the framework developed for designing/assessing programs, the results of focus groups and structured interviews, and the results of the pilot program assessments; we will also ask a number of professional organizations (eg. OMA, ONA, ONHA) for permission to write brief review articles summarizing the relevant recommendations and study findings;

(iii) a tool kit for health care agencies (content to be determined, but proposed content to include: templates of business plans for hand hygiene programs, suggested methods for tracking soap and alcohol handwash use, targets for soap/alcohol handwash use per 1000 bed/days or patient visits, draft presentations for provider education programs, sample hand hygiene policies, manuals/tools/cost estimates for auditing hand hygiene, annotated list of strategies that have been useful in providing incentives (eg. “caught in the act chocolates” for staff compliant with hand hygiene, suggestions for how to incorporate hand hygiene into performance appraisal) and reducing barriers (eg. how to remain compliant with fire safety rules across Canada when storing alcohol based product) along with email contacts for “mentors” who have used these strategies successfully, fact sheets targeted to different health care professional groups, patients and visitors)

(iv) submission of the pilot project results to such forums as the best practice sessions at the Quality Healtcare Networks Leading Forum

(v) we will seek industry funding for an annual competition through CHICA-Canada for the best abstract describing a health care facility/agency hand hygiene program, to be presented at the CHICA national meeting;

(vi) accredited, problem-based web-learning modules about hand hygiene for nurses, respiratory therapists, physicians and infection control practitioners.

A piece of this project will also be to identify feasible marketing strategies likely to be effective in promoting hand hygiene; we anticipate taking advantage of this learning process to identify other strategies for knowledge translation from this project, and promotion of hand hygiene.

8. HOW DO YOU INTEND TO PLAN THE RESEARCH AND TRANSLATION OF KNOWLEDGE?

The project will be coordinated by Ms. Karen Green, an experienced research manager within the infectious disease research group. She will work 8 hours per week on the project, directing a full time research assistant, MSc students, and summer students. During the course of the project, monthly teleconferences will be held with the advisory board to summarize progress and make decisions. It is anticipated that the research manager, research assistant and graduate students will also be emailing and telephoning investigators and board members for assistance as necessary.

A one-day, in-person meeting of the advisory board will be held in Toronto in December 2005 or January, 2006 to discuss the results of the systematic reviews, finalize the survey (to be mailed mid-January 2006), revise the framework for proceeding with the qualitative work. A second in-person meeting will be held in the fall of 2006 to review the preliminary results of focus group and interview analysis, and review/approve the draft of strategies for acute and long term care facilities. A third in-person board meeting will be held in June of 2007, to finalize recommendations from phases I and II, and to complete the plan for knowledge dissemination. Additional funding will be sought for a final meeting at the end of phase III. This will be planned as a broader workshop with data presentations from the study, and from other initiatives. The advisory board will be provided with updates and interim reports for each teleconference and meeting.

A timeline is appended after the references.

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